Archives of Biology and Engineering
An open access journal
eSciRes
ABE-1-e101

Editorial

STEM Communication through Socio-environmental Systems In and Out of Under-served Localities

Goins GD*
Department of Biology, White House Champion of Change for HBCUs, North Carolina A&T State University, USA

Editorial

Here I describe a novel approach to help address broadening participation challenges in the 21st century. Minority populations, according to the National Assessment of Educational Progress 2013 survey, have a performance gap in math as early as fourth grade [1]. Furthermore, 2013 Census Bureau data tell us that minorities are graduating from high school at a lesser rate, and those who do complete high school are less likely to immediately enroll in a two-year or four-year institution. The data also tell us that they are even less likely to become STEM majors, and these effects are multiplied for women. These trends are made even more troubling in light of projected race/ethnic shifts in the US population [2].

The middle school years are a pivotal time in the development of student behaviours, attitudes, and work habits, and therefore this is an inflection point for approaches to change the trajectory of the student towards STEM. Socio-environmental resilience is a key concept, and a powerful metaphor for how to engage students and teachers. Disadvantaged youth may have no or fewer positive adult role models in their lives. The influence of family status variables (family income, parental education, and family structure), peer support, and neighbourhood risk is a strong combined factor in predicting performance in middle and junior high school students. More and more societal importance and emphasis are being placed on exploration and development of sustainable technologies because the underlying principles speak to deeply held beliefs in personal and societal responsibility and inherent ethical positions [2]. Therefore, an ecological approach is very important when addressing the problem of academic underachievement within the African American community [3]. Humanity is reliant upon the physical resources and natural systems of the Earth for the provision of food, energy, and water (FEW). It is becoming imperative that we determine how society can best integrate across the natural and built environments to provide for a growing demand for food, water and energy while maintaining appropriate ecosystem services. These interconnections and interdependencies associated with the food, energy and water nexus create research grand challenges in understanding how the complex, coupled processes of society and the environment function now, and in the future [4].

We should build interdisciplinary collaborations that pursue data-driven solutions to pressing socio-environmental problems that are culturally relevant to ethnic minority populations in underserved areas. This approach could use the common view of natural resources for life as the tipping point to drive environmental sustainability. Such an improvement networked community (NIC) could provide families, local business owners, civic groups, neighbourhood organizations, youth groups, churches and academic institutions the opportunity to become involved in a community-based network to protect natural resources in and out their neighbourhoods. Emphasizing problem-solving approaches to environmental issues could stimulate interest, motivation, and self-efficacy for STEM learning for students and for improving STEM teaching for teachers [5-7]. Helping students take on challenging scientific problems and cope with and overcome the setbacks in field and laboratory settings can help combat negative stereotypes faced by underrepresented groups in STEM and encourage students to adopt “growth mind-sets” [8] while crossing critical educational junctures to innovate and contextualize best practices in for high-impact.

Students at the middle school through early undergraduate levels, who receive quantitative and systems-thinking STEM enrichment, will perform better on standardized examinations and will be more successful in college, particularly in the freshman year of transition. Communities could adapt and implement a theoretical framework that serves to unify approaches to research, instruction, and assessment for complex ecosystem contexts. Schools and communities could develop sustainable infrastructure projects and combine data and models from multiple local neighbourhood sources. This will provide new ways in which STEM knowledge is created and applied to better understand water availability, quality, and dynamics for local neighbourhoods. It will also help to provide families a more comprehensive understanding of the interactions between natural and engineered aspects of the water cycle. Because of FEW nexus data uncertainty, incompleteness and bias, this will address the need for community infrastructure (shared data sets, evaluation metrics, models, tools), and the training of a new generation of scientists with the requisite training in the Data Sciences and the FEW sciences to facilitate progress at their interface of STEM disciplines.

References

1. Estrada-Hollenbeck MA, Woodcock A, Hernandez PR, et al. (2011) Toward a model of social influence that explains minority student integration into the scientific community. J Educ Psychol 103(1): 206-222.
2. Harper, S. R. and K. A. Griffin (2011) Opportunity beyond affirmative action: How low-income and working class Black male achievers access highly selective, high-cost colleges and universities. Harvard J African American Public Policy 17(1): 43-60.

3. Henry DB (2000) Peer groups, families, and school failure among urban children: Elements of risk and successful interventions. J Preventing School Failure: Alternative Education for Children and Youth 44(3): 97-104.
4. Mohtar RH, Daher B (2012) Water, energy, and food: The ultimate nexus. Encyclopedia of Agricultural, Food, and Biological Engineering Second Edition.
5. Musters CJM, de Graaf HJ, ter Keurs WJ (1998) Defining socio-environmental systems for sustainable development. Ecological Economics 26(3): 243-258.
6. Bandura A, Locke EA (2003) Negative self-efficacy and goal effects revisited. J Appl Psychol 88(1): 87-99.
7. Trauth-Nare A (2015) Influence of an intensive, field-based life science course on pre-service teachers' self-efficacy for environmental science teaching. J Science Teacher Educ 26(5): 497-519.
8. Dweck CS (2007) Boosting achievement with messages that motivate. Education Canada 47(2): 6-10.

***Corresponding author:** Gregory D Goins, Ph.D., Professor of Biology, Department of Biology, White House Champion of Change for HBCUs, North Carolina A&T State University, 1601, E. Market Street, Greensboro, NC 27411, USA, Tel: 336-285-2191, Fax: 336-334-7105; Email: gdgoins@ncat.edu

Received date: September 06, 2017; **Accepted date:** October 30, 2017; **Published date:** November 06, 2017

Citation: Goins GD (2017) STEM Communication through Socio-environmental Systems In and Out of Under-served Localities. *Arch Biol Eng* 1(1): e101.